

As discussed in the February 9, 2006 telephone interview, Applicant submits that Alt does not disclose “an electrode that is smaller than 10 μm ” as recited in independent claim 10. In contrast, Alt discloses a single polymer fiber 2 having a thickness of 8 to 20 microns. However, the individual fibers 2 are bundled together 3 to form a fiber electrode 1a. Accordingly, the electrode 1a is larger than 10 μm . See, Alt, col. 6, lines 24-40; col. 9, lines 45-59; and Figure 1. Thus, Alt does not disclose each and every feature recited in independent claim 10. Therefore, Alt does not anticipate independent claim 10.

As claims 11-12, 14-16, 28, and 29 depend from claim 10, Applicant submits that claims 11-12, 14-16, 28, and 29 are therefore patentable for at least the same reasons as discussed above with respect to claim 10. Based on the February 9, 2006 telephone interview, the Examiner has withdrawn these rejections in view of new references, which are addressed below.

Claims 10, 14, 28, and 29 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 3,826,244 to Salcman et al. (“Salcman”), U.S. Patent No. 4,959,130 to Josowicz et al. (“Josowicz”), U.S. Patent No. 6,208,881 to Champeau, U.S. Patent No. 6,301,492 to Zonenshayn, and U.S. Patent No. 6,416,520 to Kynast et al. (“Kynast”). The Examiner contends that each of these references disclose an electrode smaller than 10 μm . Applicant respectfully traverses this rejection.

Applicant submits that Salcman, Kynast, Zonenshayn, and Champeau do not disclose “an electrode that is smaller than 10 μm ” as recited in independent claim 10. In contrast, Salcman, Kynast, and Zonenshayn each merely disclose an electrode having a tip that is less than 10 μm in

diameter. Furthermore, Champeau discloses an electrode having “patches” formed on the surface of the lead.

Specifically, Salcman discloses a thumbtack microelectrode having a tip 15 that is 1-3 microns in diameter. The diameter of the tip 15 increases to 10 microns at a distance of 100 microns from the tip. See, Salcman, col. 4, lines 10-12 and Figure 1. The electrode shaft 12 is 0.001 inches in diameter (which corresponds to 25.4 μm). See, Salcman, col. 4, lines 10-12. Likewise, Kynast discloses a probe 1 that merely has a tip exposure in the range of 1 to several microns. A patient's head is held in place using a headring structure 4. The stereotactic arc system 10 engages with a probe carrier structure C containing a probe carrier 14. See, Kynast, col. 3, lines 13-31. As illustrated in Figure 1, only the tip of the probe 1 is capable of being inserted into the patient's head, since the probe 1 is supported by the probe carrier 14 and driven by a probe drive block 20. See, Kynast, col. 5, lines 11-17 and Figure 1. Therefore, the probe 1 is not “an electrode that is smaller than 10 μm ,” as recited in claim 10.

Zonenshayn discloses a deep brain stimulator lead 102 having a microelectrode 100 enclosed within. The microelectrode 100 is made of a wire approximately 0.27 mm (which corresponds to 270 μm) in diameter. Only the tip 110 of the microelectrode 100 has a diameter of 1-3 microns. See, Zonenshayn, col. 3, lines 64-65; col. 4, lines 5-10 and Figure 1. Champeau discloses an electrical lead having electrode “patches” 30, 32, 34, 36, 38 formed on the surface of the lead. The patches 30, 32, 34, 36, 38 are made from multiple layers of thin metal films, such that the overall thickness of the multilayer structure is between 5-250 microns. See, Champeau, col. 2, lines 35-44; col. 3, lines 24-26 and col. 5, line 22 through col. 6, line 34; and Figure 1.

As demonstrated above, none of these references disclose “an electrode that is smaller than 10 μm , the electrode being deployed from the catheter in a blood vessel proximate to the neural tissue,” as recited in independent claim 10. Therefore, Salcman, Kynast, Zonenshayn, and Champeau do not anticipate the invention recited in claim 10.

Josowicz discloses an ultramicroelectrode made of a metal wire 1 and having an insulating layer 2 that is resistive to chemical and mechanical influences. See, Josowicz, col. 1, line 64 through col. 2, line 2. The thickness of the wire is in the range of 0.1 to 15 microns, and the wire has a tapered end with a diameter of 0.1 microns. The thickness of the insulating layer is between 1.0 and 3.0 microns. See, Josowicz, col. 5, lines 36-47 and Figures 1A-1B. Josowicz discloses in col. 7, lines 40-44 that the ultramicroelectrode is useable in biochemical and medical regions such as inverse Voltammetry. The ultramicroelectrode is held using a glass capillary as a holder. See, Josowicz, col. 6, lines 17-19 and Figures 3A-3B.

Applicant submits that Josowicz is non-analogous art. As described above, Josowicz is directed to providing chemically and mechanically stable insulation for electrodes. The electrodes are used as amperometric or potentiometric sensors, or as electrodes for inverse Voltammetry in an electrolytic solution such as a potassium chloride (KCl) solution. See, Josowicz, col. 1, line 64 through col. 2, line 7; col. 7, line 40 through col. 8, line 11; and col. 8, lines 47-49. In contrast, the present invention is directed to electrodes that are capable of being inserted into a human capillary, blood vessel, or neural tissue in the human brain. Thus, at the time of the invention, a person of ordinary skill in the art of making electrodes for insertion into neural tissue in the human brain would not look to Josowicz to achieve the invention of claim 10.

Additionally, Applicant notes that the U.S. Patent and Trademark Office (“USPTO”) recognizes that there are various types of electrodes. Josowicz has an International Classification of G01N 27/30; G01N 27/333; and C25D 9/02, while the present invention was assigned an International Classification of A61B 005/04 by the USPTO. Further, the U.S. Classifications of Josowicz¹ do not overlap with the U.S. Classifications assigned to the present invention² by the USPTO. Thus, at the time of the invention, a person of ordinary skill in the art of making electrodes for insertion into the human body would not look to Josowicz to achieve the invention of claim 10.

As demonstrated above, none of the Examiner's newly-relied upon references disclose or suggest each and every feature recited in independent claim 10. Claims 14, 28, and 29 depend from claim 10. Applicant submits that dependent claims 14, 28, and 29 are therefore patentable for at least the same reasons as discussed above with respect to independent claim 10. Applicant respectfully requests reconsideration and withdrawal of the rejection.

Claims 11, 12, 15, and 16 have been rejected as being anticipated by Salcman, Kynast, Zonenshayn, Josowicz and Champeau or, in the alternative, as being obvious over Salcman, Kynast, Zonenshayn, Josowicz and Champeau in view of U.S. Patent No. 5,883,603 to Kovacs et al. (“Kovacs”) and/or U.S. Patent No. 4,913,160 to John. Applicant respectfully traverses this rejection.

As demonstrated above with respect to claim 10, Salcman, Kynast, Zonenshayn, Josowicz and Champeau do not disclose “an electrode that is smaller than 10 μm .” Furthermore, neither

¹ Josowicz's U.S. Classification: 205/210; 204/400; 204/416; 204/418; 205/171; 205/188; 205/198; 205/219; 205/220; 205/229; 205/317; 428/457; 428/461; 428/626; 600/345; 600/395.

Kovacs nor John discloses or suggests “an electrode that is smaller than 10 μm ,” as recited in claim 10. In contrast, Kovacs and John are directed to devices which have amplifiers, digital converters, multiplexers, and microprocessors for coupling to an electrode in order to provide signal processing. Neither Kovacs nor John disclose information relating to the diameter or size of an electrode. Thus, Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, and John do not, either individually or in combination, disclose each and every feature recited in independent claim 10.

Claims 11, 12, 15 and 16 depend from claim 10. Applicant submits that dependent claims 11, 12, 15, and 16 are therefore patentable in view of the above references for at least the same reasons as discussed above with respect to claim 10. Applicant respectfully requests reconsideration and withdrawal of this rejection.

Rejection under 35 U.S.C. 103

Claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Alt, Kovacs, and John in view of U.S. Patent No. 6,615,067 to Hoek. Claim 17 was rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Alt, Kovacs, and John in view of U.S. Patent Publication 2002/0117659 to Lieber et al.

As discussed above, Alt fails to disclose each and every feature recited in independent claim 10. Claims 13 and 17 depend from claim 10. Applicant submits that dependent claims 13 and 17 are therefore patentable for at least the same reasons as discussed above with respect to claim 10. Based on the February 9, 2006 telephone interview, the Examiner has withdrawn these rejections in view of new references, which are addressed below.

² Present invention's U.S. Classification: 600/544; 600/381; 600/554; 977/905.

Claim 13 stands rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, and John in view of U.S. Patent No. 6,615,067 to Hoek. The Examiner acknowledges that Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, and John do not disclose a Schmitt trigger. However, the Examiner relies on Hoek as disclosing a Schmitt trigger, and contends that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the cited references to achieve the claimed invention. Applicant respectfully traverses this rejection.

As demonstrated above, Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, and John do not disclose “an electrode that is smaller than 10 μm ,” as recited in independent claim 10. Furthermore, Hoek does not disclose “an electrode that is smaller than 10 μm .” Thus, Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, John, and Hoek do not, either individually or in combination, disclose each and every feature recited in independent claim 10.

Claim 13 depends from claim 10. Applicant submits that dependent claim 13 is therefore patentable in view of the above references for at least the same reasons as discussed above with respect to claim 10. Applicant respectfully requests reconsideration and withdrawal of this rejection.

Claim 17 has been rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, and John in view of U.S. Patent Publication No. 2002/0117659 to Lieber et al. (“Lieber”). The Examiner acknowledges that Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, and John do not disclose nano-electrodes having a nano-wire and a micro-wire. However, the Examiner relies on Lieber as

disclosing nano-sensors having nano-electrodes 36 connected to a nanowire 38. See, Lieber, Figure 1A and paragraphs 133-135. The Examiner contends that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the cited references to achieve the invention recited in the claim. Applicant respectfully traverses this rejection.

As demonstrated above, Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, and John do not disclose “an electrode that is smaller than 10 μm ” as recited in independent claim 10. Furthermore, Lieber does not disclose “an electrode that is smaller than 10 μm .” Thus, Salcman, Kynast, Zonenshayn, Josowicz, Champeau, Kovacs, John, and Lieber do not, either individually or in combination, disclose each and every feature recited in independent claim 10.

Claim 17 depends from claim 10. Applicant submits that dependent claim 17 is therefore patentable in view of the above references for at least the same reasons as discussed above with respect to claim 10. Applicant respectfully requests reconsideration and withdrawal of this rejection.

CONCLUSION

Each and every point raised in the Office Action dated January 24, 2006 has been addressed on the basis of the above remarks. In view of the foregoing it is believed that claims 1-36 are in condition for allowance and it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue. A prompt and favorable action in this regard is earnestly solicited.

If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

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